

B3

R>90%. The channel selector is dimensioned to have a free spectral range (FSR_{Channel_Selector}) differing from that the grid generator (FSR_{Grid_Gen}) by an amount corresponding substantially inversely with the number of channels in the wavelength grid. Both free spectral ranges of the grid generator and channel selector are broader than the free spectral range of the cavity (FSR_{Cavity}) (See FIG. 4 and FIGS. 5A-C). In an embodiment of the invention, the FSR of the channel selector differs from the FSR of the grid generator by an amount which substantially corresponds to the quotient of the channel spacing and the number of channels in the wavelength grid, e.g., an ITU grid (See FIG. 4 and FIGS. 5A-C). Vernier tuning of the channel selector results in a single loss-minimum within the communications band which can be tuned across the grid. The combined feedback to the gain medium from the grid generator together with the channel selector supports lasing at the center wavelength of the selected channel and substantially attenuates all other channels (See FIG. 4 and FIGS. 5A-C). --

IN THE CLAIMS

Please cancel claims 33-58 without prejudice and replace therefor the following new claims:

59. (New) A tunable filter apparatus, comprising:

- (a) a grid generator positioned in an optical path and configured to generate a first set of transmission peaks corresponding to channels of a selected wavelength grid; and
- (b) a channel selector positioned in said optical path and configured to generate a second set of transmission peaks.

B4

60. (New) The tunable filter apparatus of claim 59, wherein said channel selector defines a tuning range for said second set of transmission peaks that is approximately equal to a channel spacing within said wavelength grid.

61. (New) The tunable filter apparatus of claim 59, wherein said grid generator includes an optical path length that defines a first free spectral range corresponding to a spacing between adjacent gridlines of said selected wavelength grid.

62. (New) The tunable filter apparatus of claim 61, wherein said channel selector includes

an optical path length that defines a second, tunable free spectral range, said second free spectral range differing from said first free spectral range by an amount corresponding approximately to the quotient of said first free spectral range and a total number of channels in said wavelength grid.

63. (New) The tunable filter apparatus of claim 59, wherein said channel selector and said grid generator operate to attenuate all channels in said wavelength grid except a selected channel.

64. (New) The tunable filter apparatus of claim 61, wherein said channel selector includes an optical path length that defines a second, tunable free spectral range FSR_2 defined by

$$FSR_2 \approx \left(\frac{M}{M \pm 1} \right) \cdot FSR_1$$

wherein M is a total number of channels within said wavelength grid and FSR_1 is said first free spectral range.

65. (New) The tunable filter apparatus of claim 61, further comprising a gain medium positioned to emit an optical beam along said optical path and receive optical feedback from said grid generator and said channel selector.

66. (New) The tunable filter apparatus of claim 65, further comprising a retroreflector positioned in said optical path, said retroreflector and a rear facet of said gain medium defining an external laser cavity.

67. (New) The tunable filter apparatus of claim 66, further comprising an error detector positioned to measure output along said optical path and configured to provide an error signal indicative of vernier tuning by said channel selector and said grid generator.

68. (New) The tunable filter apparatus of claim 33, wherein said grid generator comprises a first etalon and said channel selector comprises a second etalon.

69. (New) A laser apparatus, comprising:

(a) a gain medium emitting an optical beam along an optical path;

(b) a grid generator positioned in said optical path and configured to generate a first set of transmission peaks corresponding to channels of a selected wavelength grid; and

(c) a channel selector positioned in said optical path and configured to generate a second set of transmission peaks.

70. (New) The laser apparatus of claim 69, wherein said channel selector defines a tuning range for said second set of transmission peaks that is approximately equal to a channel spacing within said wavelength grid.

71. (New) The laser apparatus of claim 69, wherein said grid generator includes an optical path length that defines a first free spectral range corresponding to a spacing between adjacent gridlines of said selected wavelength grid, and said channel selector includes an optical path length that defines a second, tunable free spectral range, said second free spectral range differing from said first free spectral range by an amount corresponding approximately to the quotient of said first free spectral range and a total number of channels in said wavelength grid.

B4

72. (New) The laser apparatus of claim 69, wherein said channel selector and said grid generator operate to attenuate all channels in said wavelength grid except a selected channel.

73. (New) The laser apparatus of claim 69, wherein said grid generator includes an optical path length that defines a first free spectral range FSR_1 corresponding to a spacing between adjacent gridlines of said selected wavelength grid, and said channel selector includes an optical path length that defines a second, tunable free spectral range FSR_2 defined by

$$FSR_2 \approx \left(\frac{M}{M \pm 1} \right) \cdot FSR_1$$

wherein M is a total number of channels within said wavelength grid and FSR_1 is said first free spectral range.

74. (New) The laser apparatus of claim 69, further comprising a retroreflector positioned in said optical path, said retroreflector and a rear facet of said gain medium defining an external laser cavity.

75. (New) The laser apparatus of claim 69, further comprising an error detector positioned to measure output along said optical path and configured to provide an error signal indicative of vernier tuning by said channel selector and said grid generator.

76. (New) A method for tuning an optical beam, comprising:

- (a) generating a first set of transmission peaks corresponding to channels of a selected wavelength grid;
- (b) generating a second set of transmission peaks; and
- (c) tuning said second set of transmission peaks with respect to said first set of transmission peaks to tune said optical beam.

77. (New) The method of claim 76, wherein said generating said first set of transmission peaks comprises generating a first interference within said optical beam having a first free spectral range corresponding to a spacing between adjacent gridlines of said selected wavelength grid.

B4

78. (New) The method of claim 77, wherein said generating said second set of transmission peaks comprises generating a second interference within said optical beam having a second, tunable free spectral range.

79. (New) The method of claim 78, wherein said second free spectral range differs from said first free spectral range by an amount corresponding approximately to the quotient of said first free spectral range and a total number of channels in said wavelength grid.

80. (New) The method of claim 78, wherein second free spectral range is defined by

$$FSR_2 \geq \left(\frac{M}{M \pm 1} \right) \cdot FSR_1$$

wherein FSR_2 is said second free spectral range, M is a total number of channels within said wavelength grid, and FSR_1 is said first free spectral range.

81. (New) The method of claim 76, wherein said generating said first said transmission

peaks comprises positioning a grid generator in an optical path of said optical beam.

82. (New) The method of claim 80, wherein said generating said second set of transmission peaks comprises positioning a channel selector in said optical path.

83. (New) A tunable filter apparatus for an optical beam, comprising:

- (a) grid means for generating a first said of transmission peaks corresponding to channels of a selected wavelength grid, said grid means positioned in an optical path of said optical beam; and
- (b) channel selector means for generating a second set of transmission peaks, said channel selector means positioned in said optical path;

84. (New) The tunable filter apparatus of claim 1, wherein said grid means comprises means for generating a first interference within said optical beam having a first free spectral range corresponding to a spacing between adjacent gridlines of said selected wavelength grid.

B4
85. (New) The tunable filter apparatus of claim 83, wherein said channel selector means comprises means for generating a second interference within said optical beam having a second, tunable free spectral range.

86. (New) A laser apparatus, comprising:

- (a) gain means for emitting an optical beam along an optical path; and
- (b) vernier means, positioned in said optical path, for tuning said optical beam.

87. The laser apparatus of claim 86, wherein said vernier means comprises:

- (a) grid means for generating a first said of transmission peaks corresponding to channels of a selected wavelength grid, said grid means positioned in an optical path of said optical beam; and
- (b) channel selector means for generating a second set of transmission peaks, said channel selector means positioned in said optical path.

88. (New) The laser apparatus of claim 85, wherein said vernier means comprises: